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Estimation of the Aug 4, 2020 Beirut Explosion Using Seismic and Shockwave Data

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This study uses seismic waveform and shockwave data from the Aug 4, 2020 Beirut explosion to investigate whether the yield estimated by the shockwave data can predict the spectral level observed in the seismic data. Many stations from the IRIS Data Management Center (DMC) recorded this explosion up to hundreds of kilometers with good signal-to-noise ratios (SNR). Shockwaves were recorded by personal phones and cameras, and are from social media platforms. These shockwave data were used to obtain the arrival times at various ranges. This dataset was augmented by additional data from Rigby et al. (2020). Shockwave data were modeled using published empirical and theoretical relationships, which suggested its yield to be around 1 Kt TNT. This estimate is in agreement with the value derived by Rigby et al. based on a relation they developed using the shockwave data from Kingary and Bulmash (1984). These yield estimates were used to determine the consistency with respect to the P-wave spectra, which were corrected for the propagation and attenuation effects. Accuracy of the relationships used by various investigators is also examined by validating against the shockwave data collected for other explosions with known yields.

Promotional text

Results illustrates the consistency between the yields estimated using videos from the social media of the blast vs. seismic waveforms. This paper presents a further validation of formulae used to associate the blast data to the yield based on the GT explosions.

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